



DC Flood 101

Presented by: Steven Zubrick
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Sterling, VA

Speaker Bio

Steven Zubrick

- **Science and Operations Officer**
NWS Baltimore/Washington
1981 – present
- Education:
M.S. – Old Dominion University
B.S. – Univ. of Dayton
- *Other roles:*
 - *Past President, National Weather Association (2010)*
 - *Acting Deputy Director, Weather Prediction Center/NCEP (2014)*



DC Flood 101 Topics

- Flood History & Facts
- Knowing Your Risk
- Types of Flooding
- National Weather Service Notifications & Alerts
- Mitigation Measures
- Closing Comments



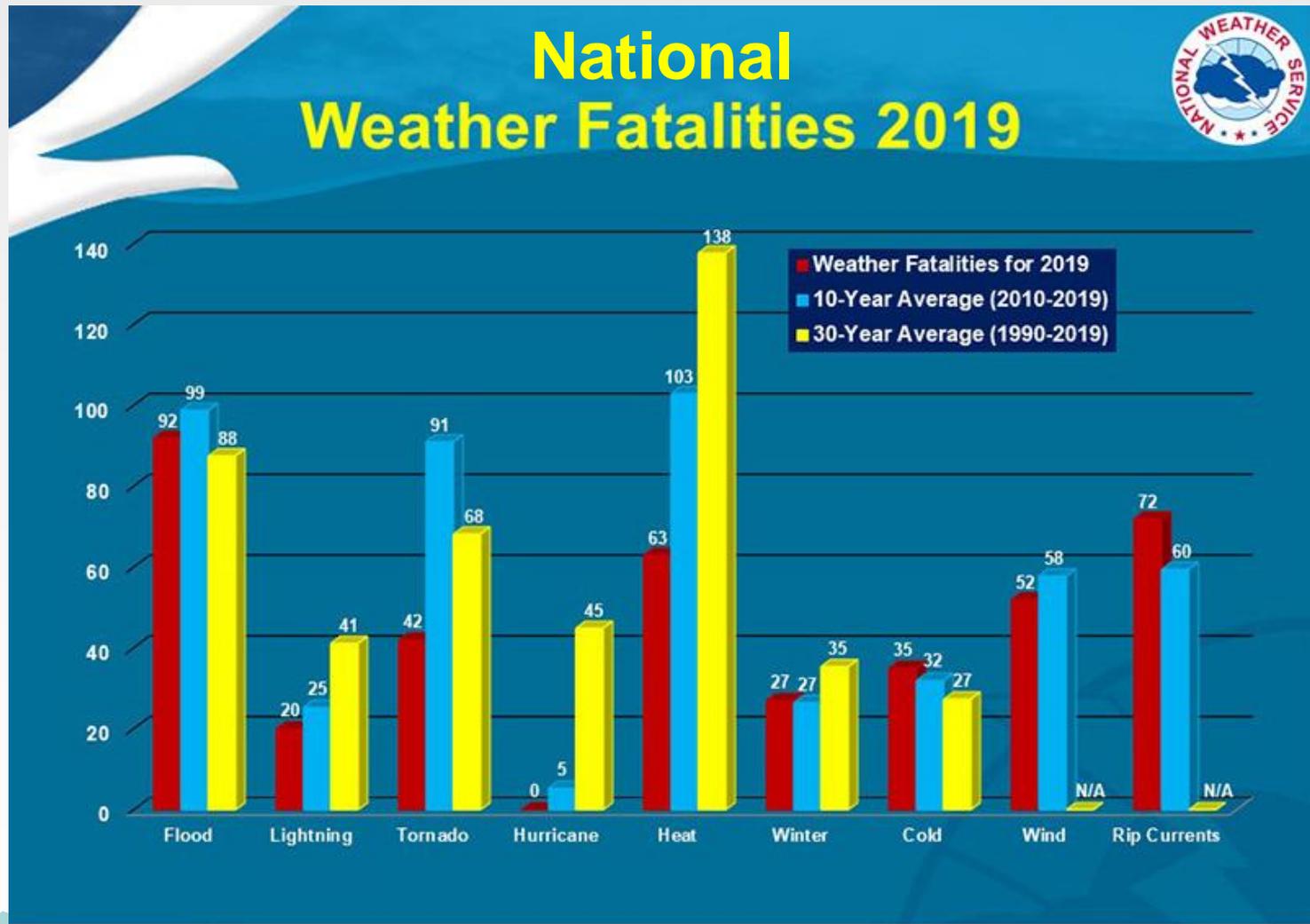
Local Flood History

Did you know?

- The first recorded floods in this region were in 1748!
 - A teenaged George Washington, working as a land surveyor, could not cross the Potomac River at Berkeley Springs due to flooding from snowmelt. Washington instead spent time at the “Medicine Springs” (today’s Berkeley Springs).
 - As the flood (maybe the same one, we’re not sure) moved down the Potomac, Robert Harper – the namesake of Harpers Ferry – had to leave his log cabin and move into a barn up on the hill.

<http://www.weather.gov/washington/FloodTimeline>

Floods – a major weather killer



Local Flood Fatalities Since 2011



None in DC; however, many in the surrounding area

- ★ 2011
- ★ 2013
- ★ 2014
- ★ 2015
- ★ 2016
- ★ 2018

Flood Facts

Most flood fatalities:

- Occur in cars
- Occur at night
- Are the result of bad decisions



Flooding on Canal Road in Washington, DC on July 8, 2019.
Photo courtesy WTOP / Dave Dildine.

Flood Safety

- If you come upon flood waters, **STOP! TURN AROUND AND GO ANOTHER WAY!**
- Only 6 inches of fast-moving water can knock you off your feet
- 2 feet of moving water will float almost any vehicle...*less for small cars*
- The road under the water might be damaged or compromised
- **Bottom line: never assume there is a safe way to drive through water**

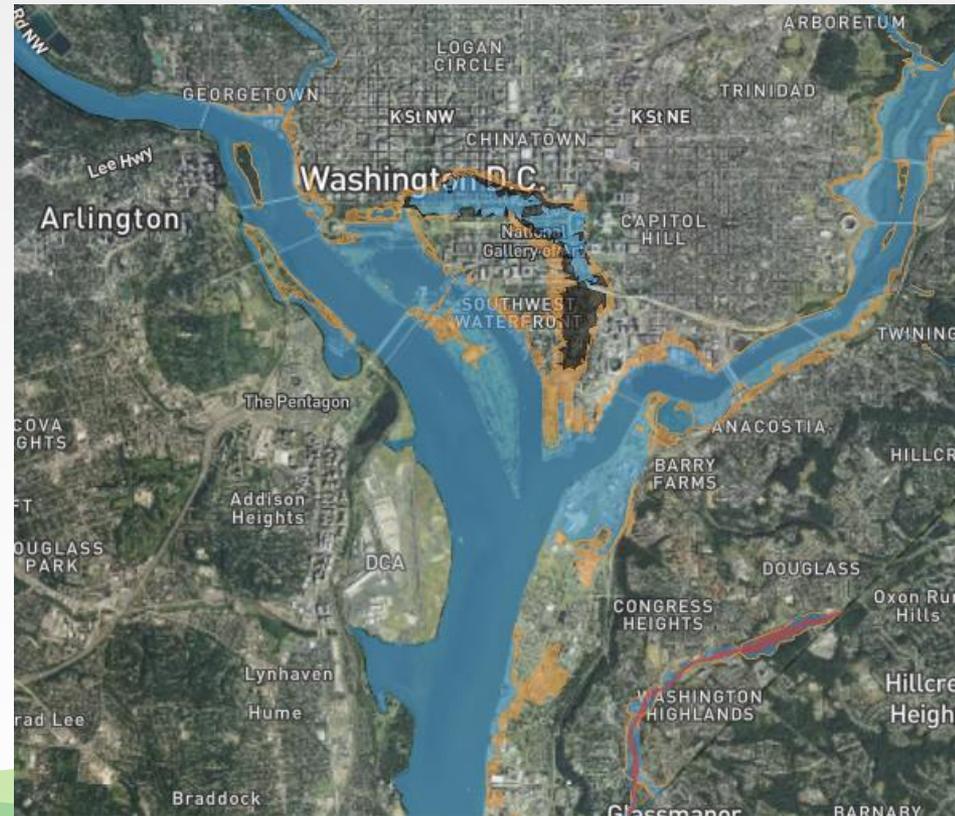


Know Your Risk

Check the FEMA Flood Maps to see if you are in a flood zone...

- <https://dcfloodrisk.org>
- National:
<https://www.floodsmart.gov>

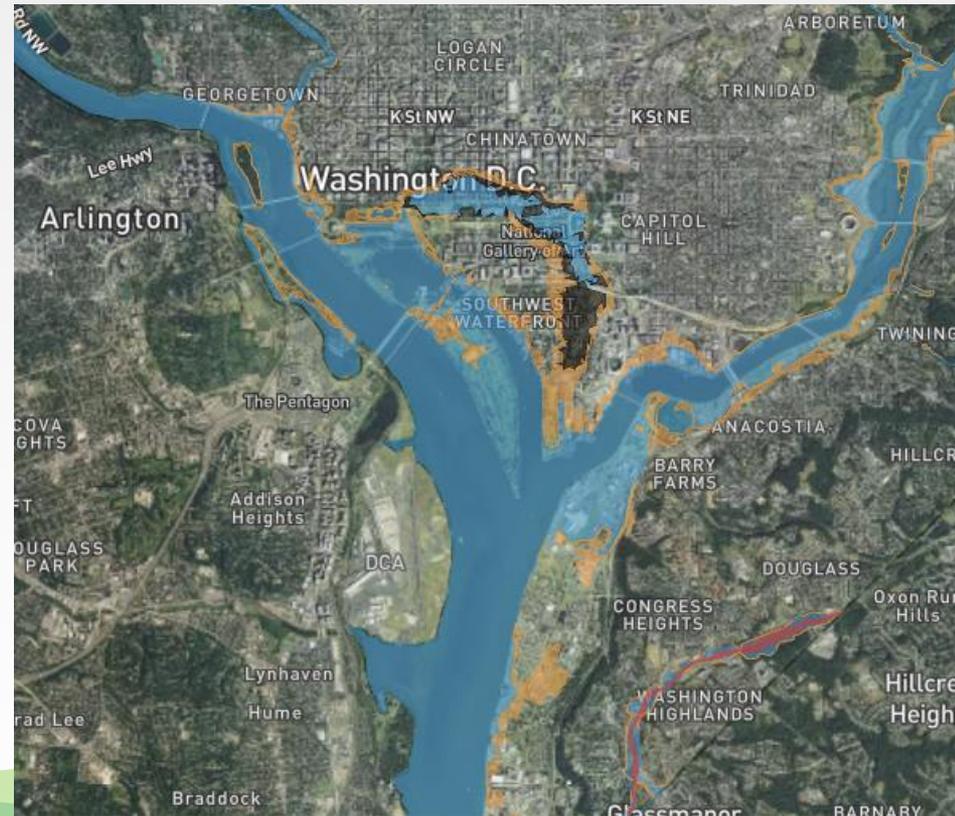
Flooding is not limited to these flood zones!
Always consider flood insurance!



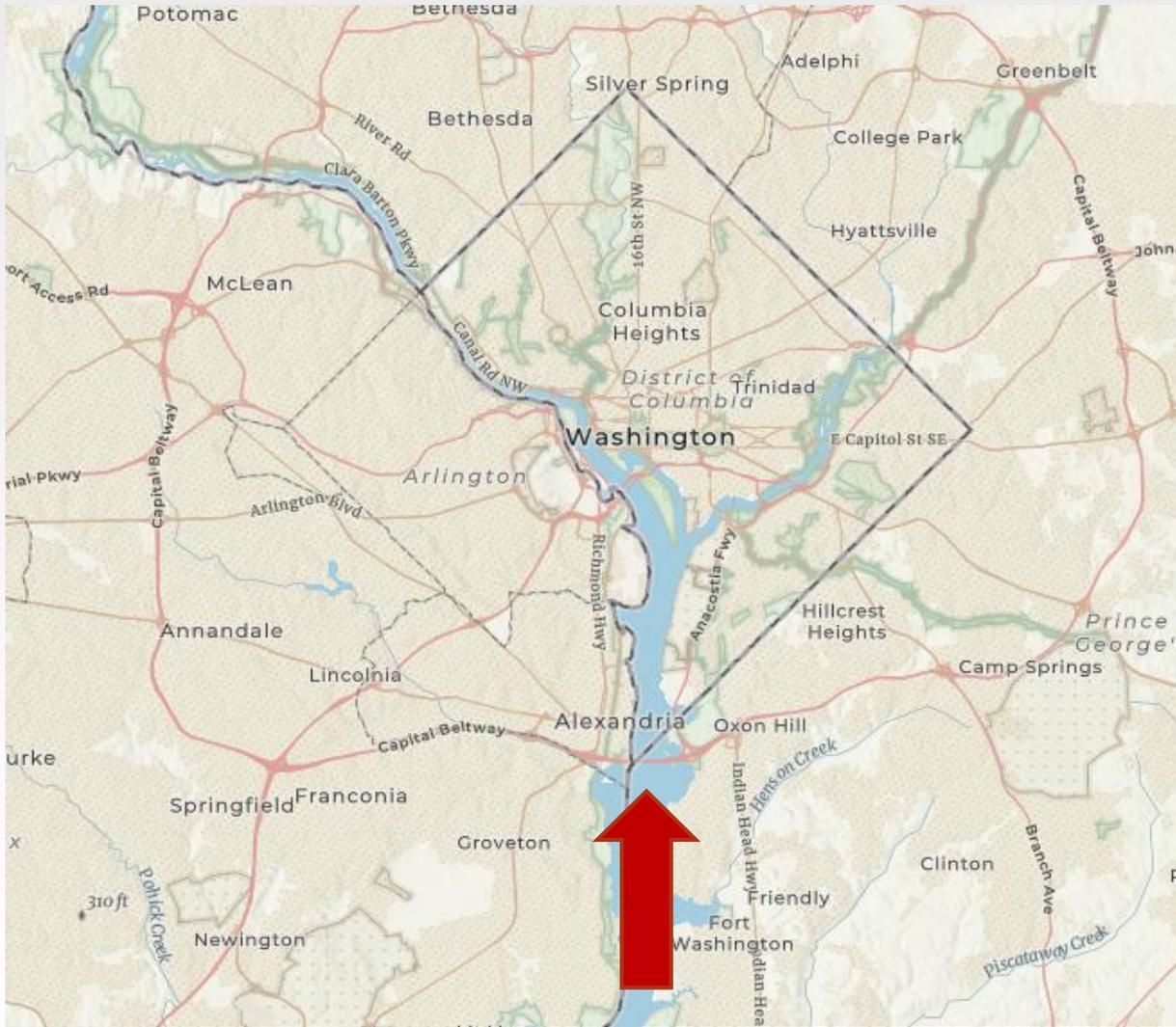
What is a “Flood Zone”?

The blue area on this graphic is the 1% chance flood zone. This area has a 1% chance of flooding every year.

- While this seems low, it adds up over time.
- In a 30-year period, a structure in the 1% chance flood zone has a 26% chance of being flooded.



Types of Flooding



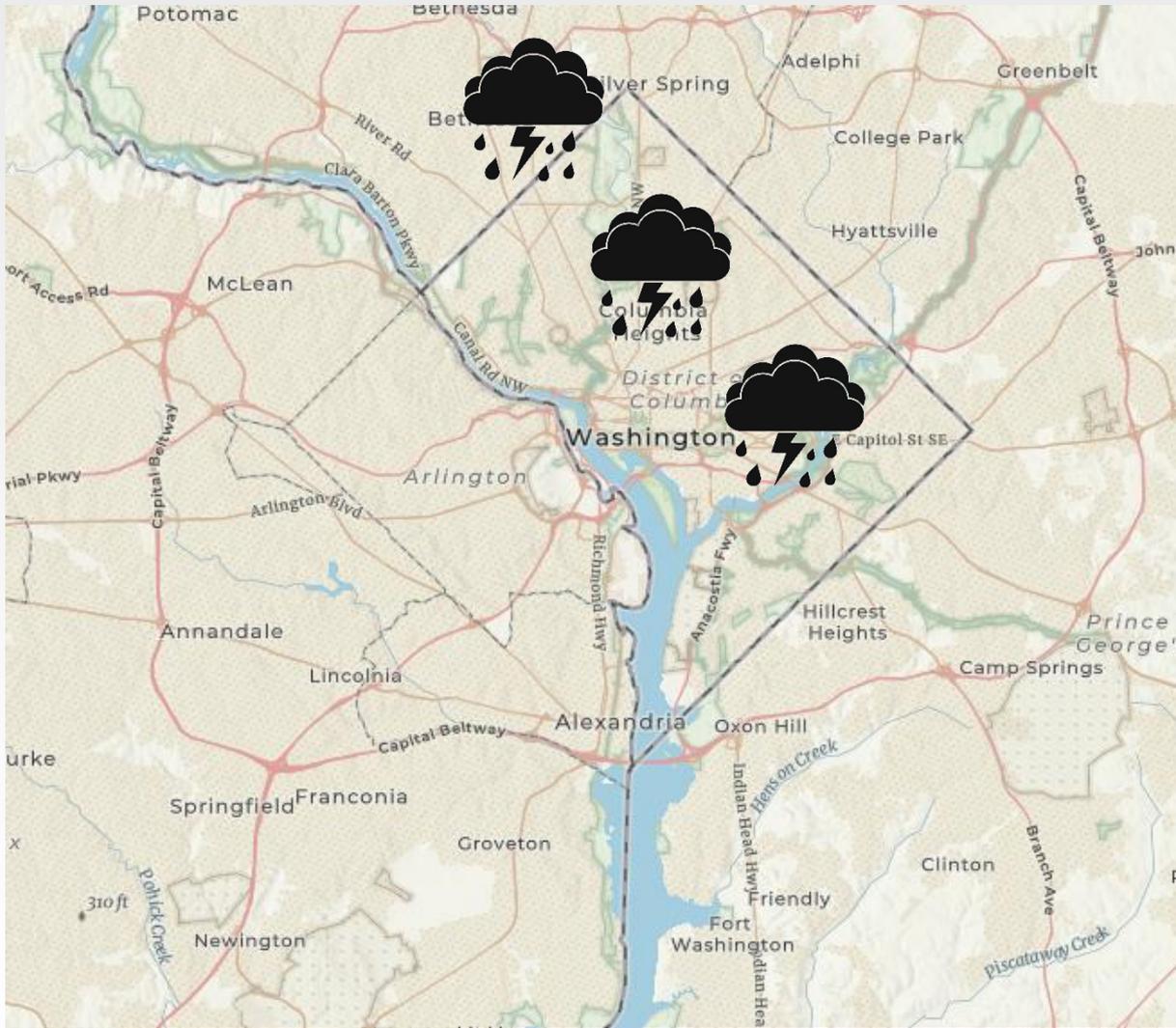
Coastal (Tidal)

- Most common
- Can happen on a sunny day

Locations in DC most often affected:

- East Potomac Park
- SW Waterfront
- Georgetown

Types of Flooding



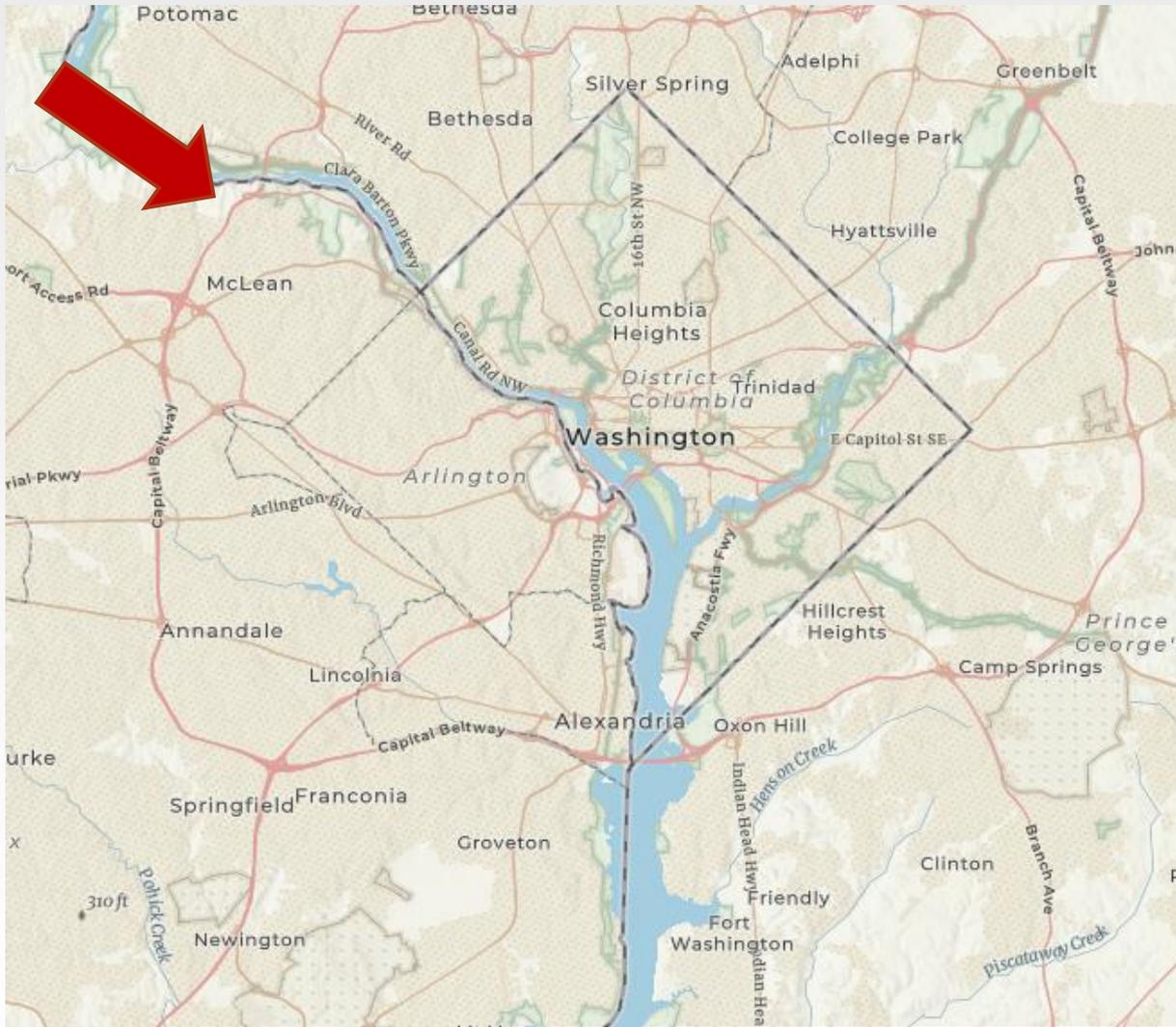
Interior

- Caused by heavy rain directly over or north of DC
- Can happen any time of year
- Can be **flash** flooding or **urban street** flooding

Locations in DC most often affected:

- Federal Triangle
- Rock Creek Park
- Anywhere storm drains are overwhelmed

Types of Flooding



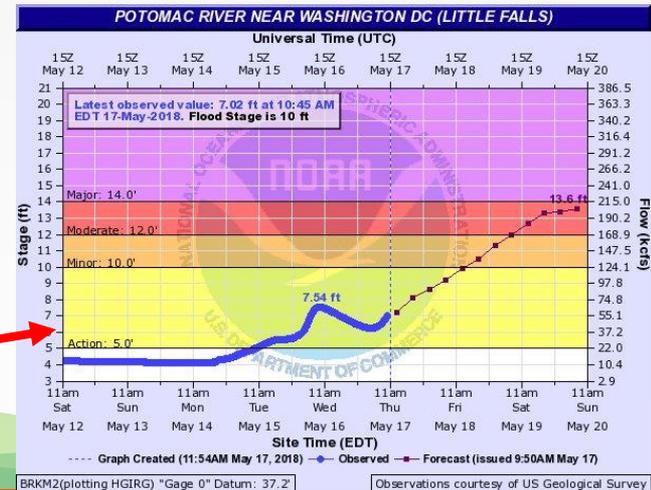
Riverine (River)

- Caused by heavy rain west of DC
- Usually floods 1-3 days after the heavy rain
- Least common but historically most impactful

Locations in DC most often affected:

- Georgetown waterfront
- All Potomac & Anacostia shores

Examples of Flooding in DC



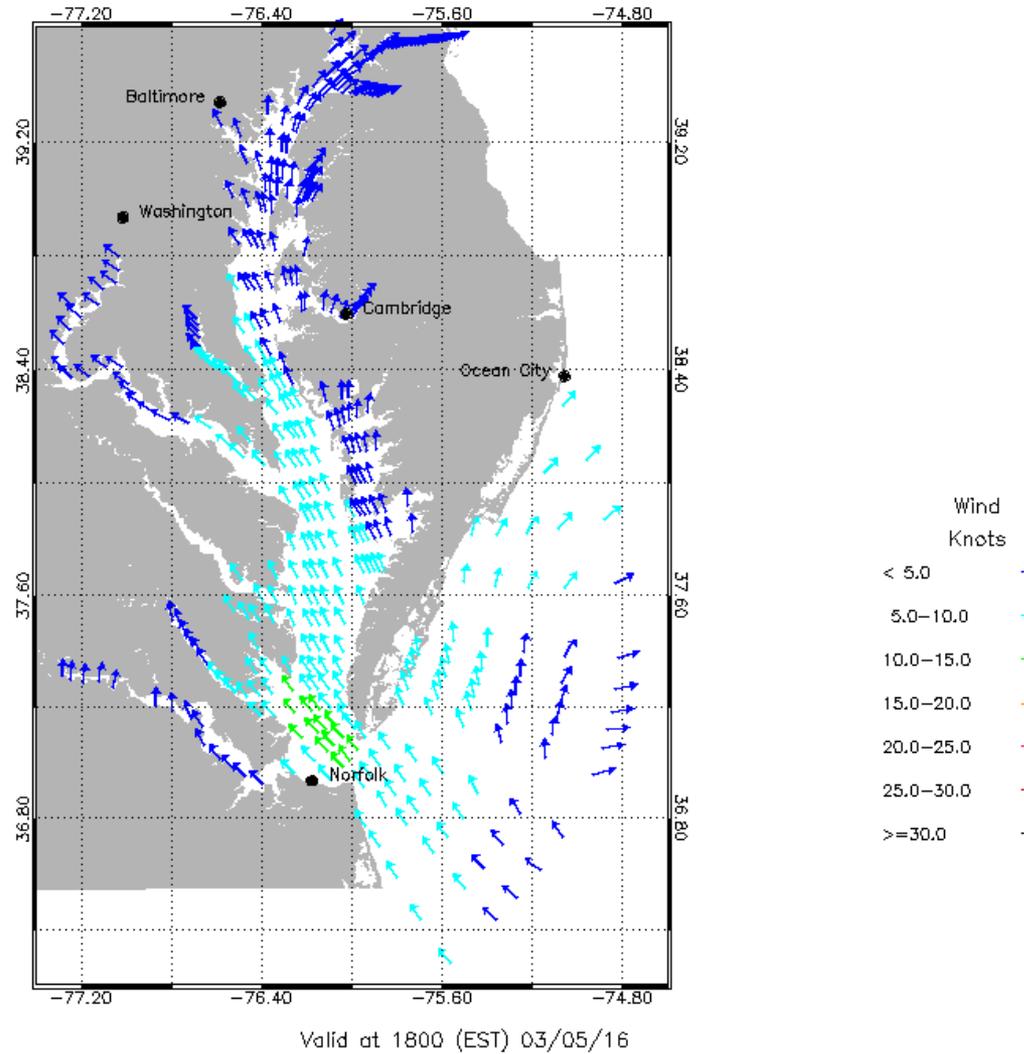
Flash Flooding

Coastal/Tidal Flooding

Street Flooding

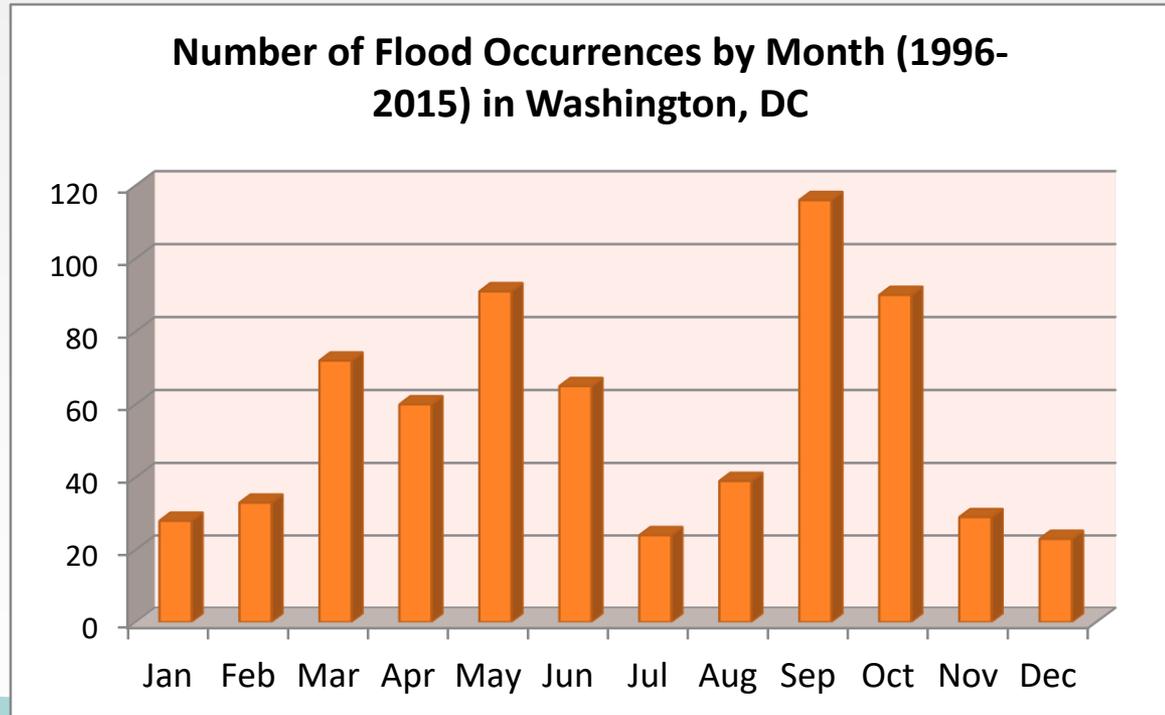
River Flooding

Coastal / Tidal Flooding



Coastal / Tidal Flooding

- **Two typical peak seasons:**
 - May/June & September/October
 - September frequently has floods even if there are no tropical storms

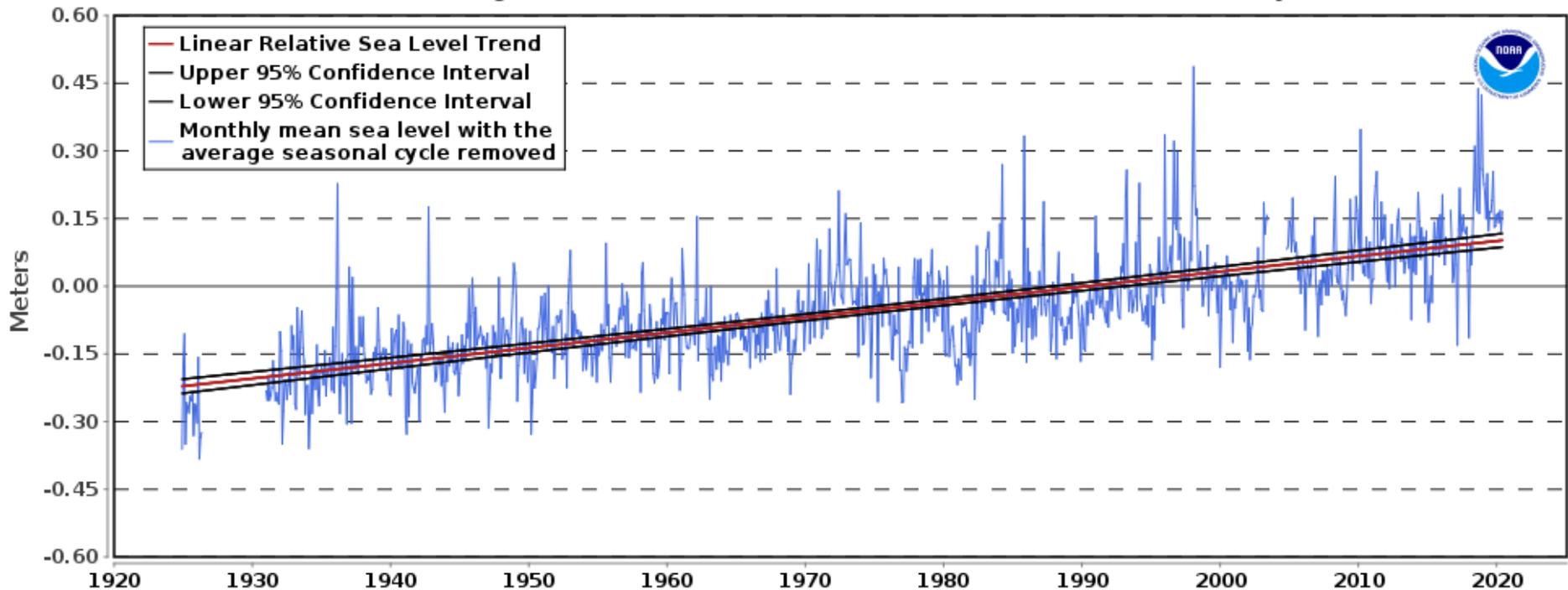


On the Rise...

- **Mean Sea Level (MSL) is steadily rising**
 - Average rate 1.1 ft per century

8594900 Washington, District of Columbia

3.39 +/- 0.28 mm/yr



Nuisance Becoming Normal

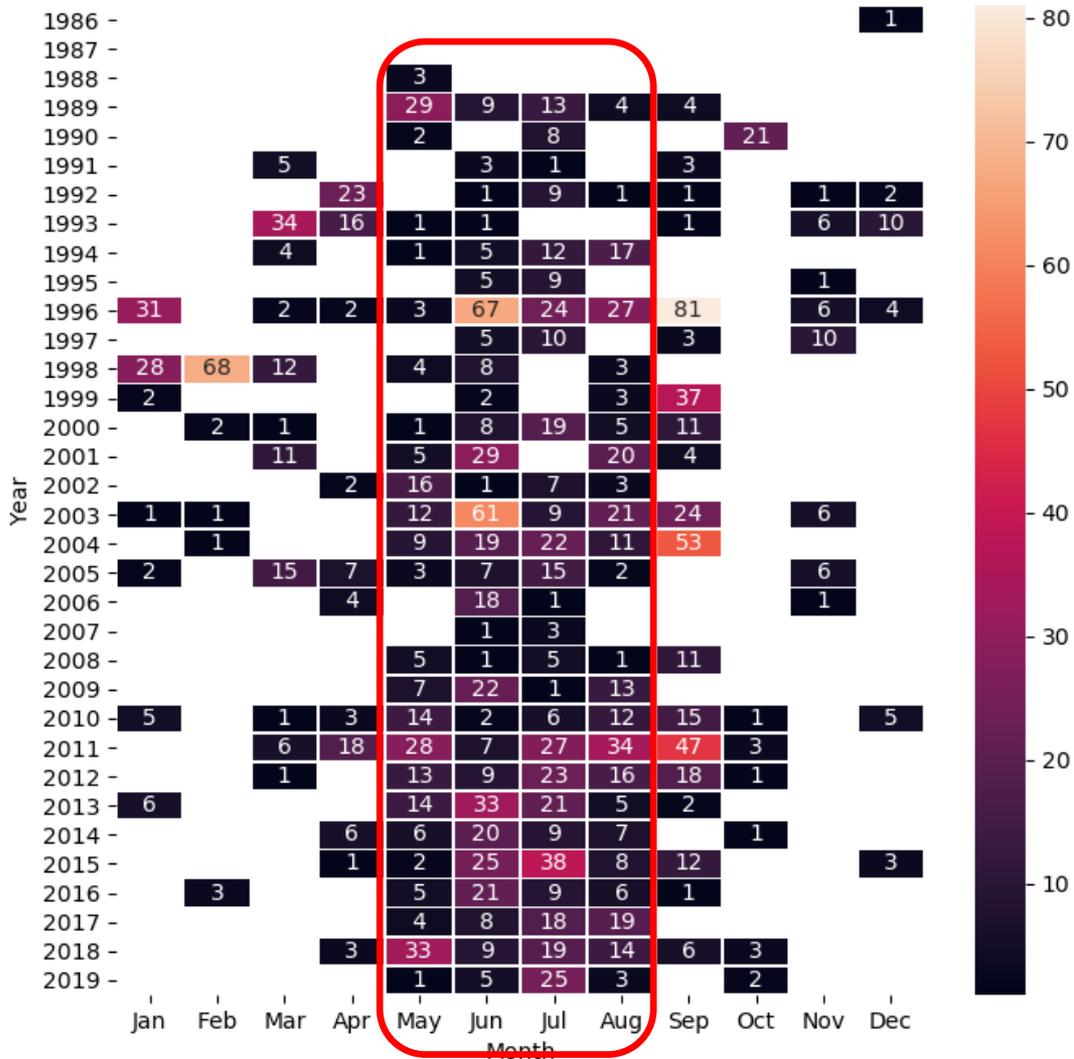
- A NOAA study finds that nuisance flooding (defined as reaching our NWS 'minor flood' level) has substantially increased in the last 50 years.
 - This is due to a rise in the base water level, not due to increased storms.

City	Average nuisance flood days (1957-63)	Average nuisance flood days (2007-13)	Percent increase
Annapolis	3.8	39.3	925%
Baltimore	1.3	13.1	922%
Washington	6.3	29.7	373%

Flood vs. Flash Flood

- **Flood** - any high flow, overflow, or inundation by water which causes or threatens damage.
- **Flash Flood** - a *rapid and extreme* flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, *which requires immediate action to protect life and property* (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.

NWS Baltimore Md/ Washington Dc Flash Flood Warning (FF.W) Issued by Year,Month

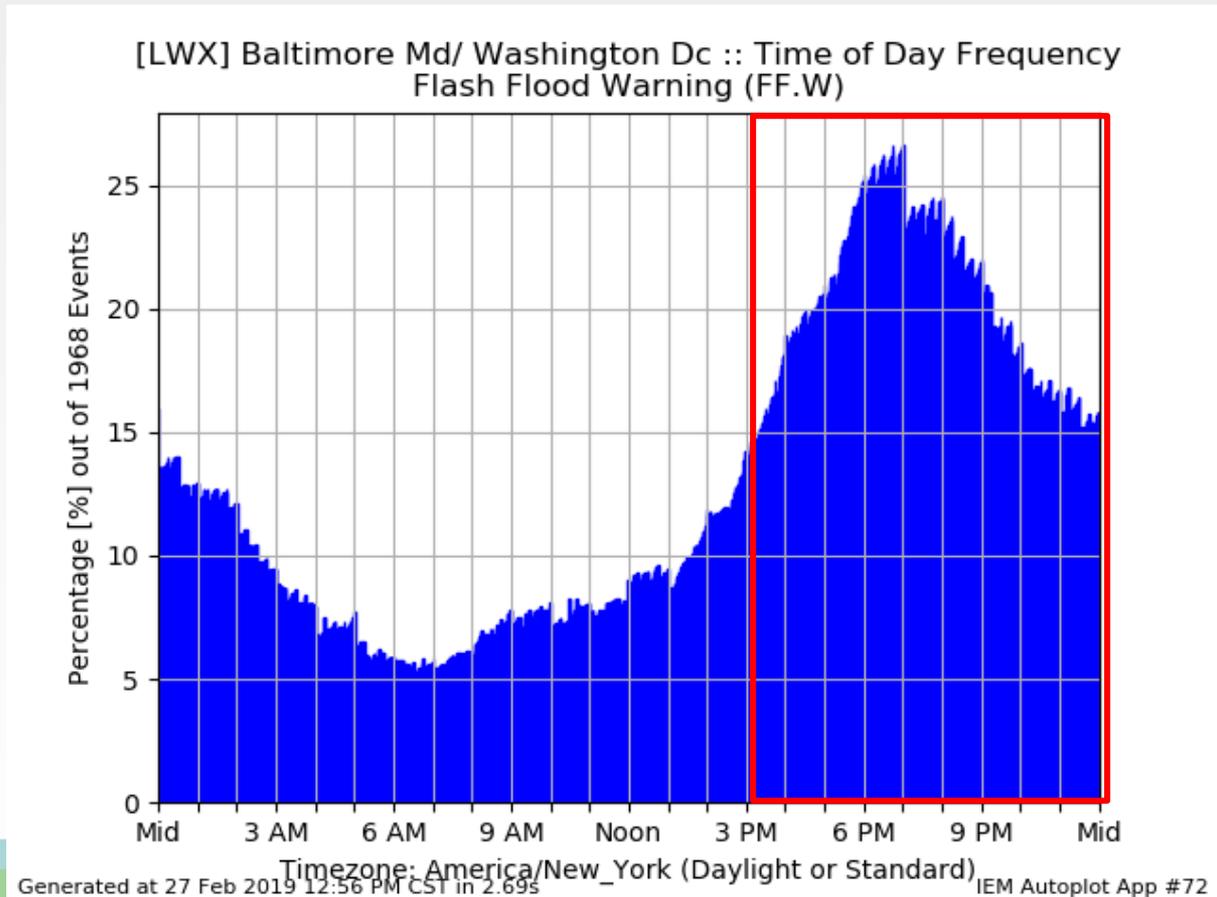


Generated at 18 Feb 2020 1:03 PM CST in 1.80s

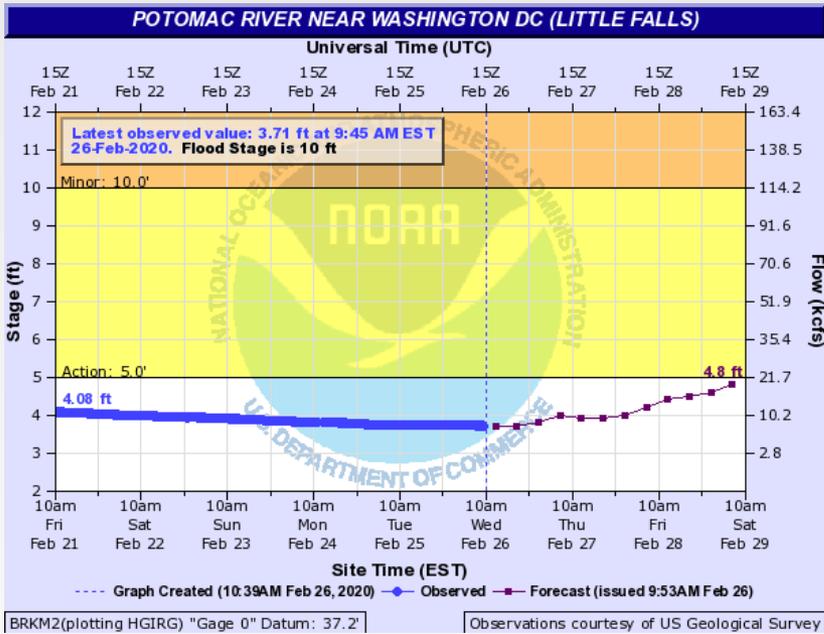
IEM Autoplot App #171

When does flash flooding occur?

- Can occur anytime - day or night
- Many flash floods occur at night (or around sunset)
- **Most flash flood fatalities occur at night!**



River Forecasts



← “Deterministic”
(one forecast value)



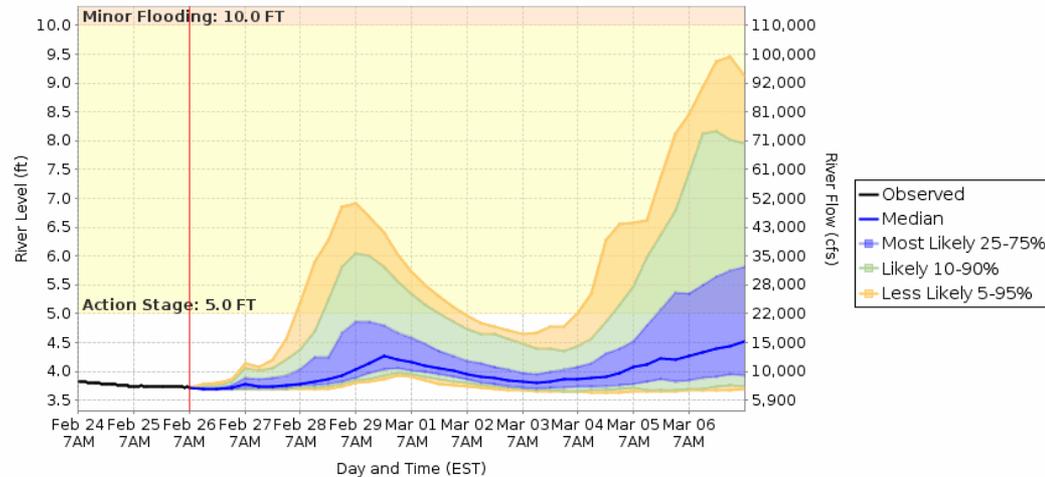
10 Day River Level Probabilities

Used to Estimate the Range of Possible River Levels

Caution: Official forecast may be updated after this graph is generated.
For the latest official forecast, go to <http://water.weather.gov/ahps>



Potomac River at Little Falls near Washington, DC



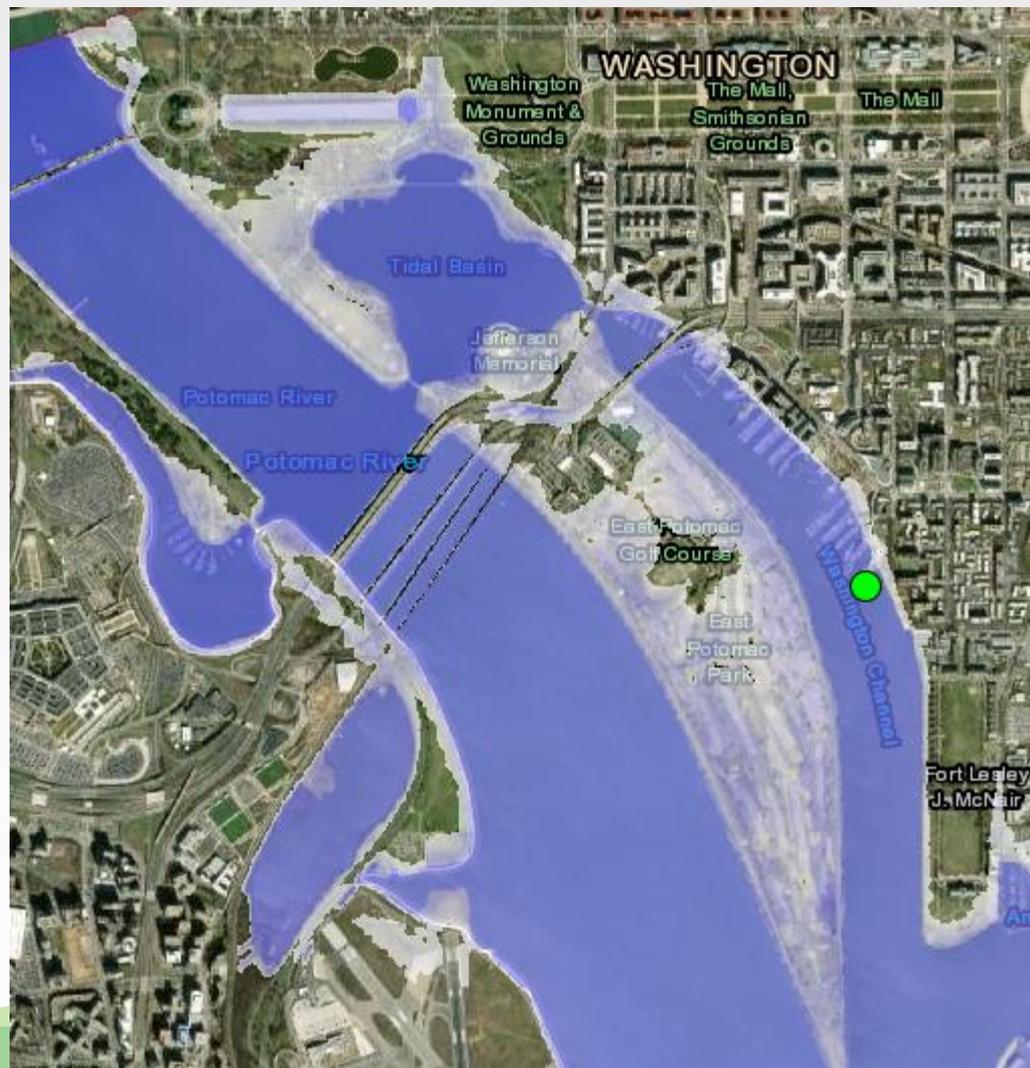
→ “Probabilistic”
(range of possibilities)

Model runtime: 07:00 AM EST Feb 26 2020
Middle Atlantic River Forecast Center

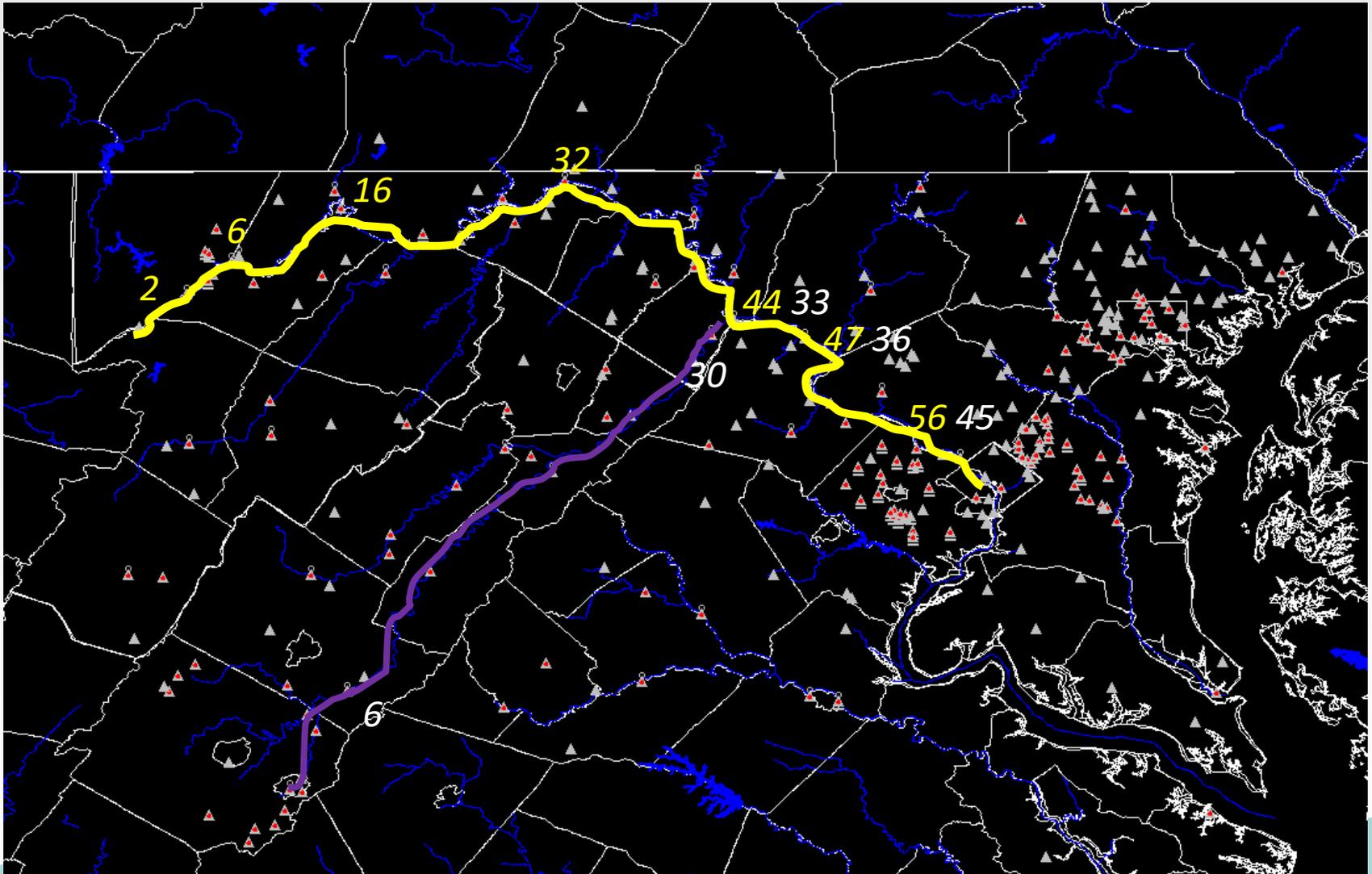


Using Potomac River Forecasts

- The DC Silver Jackets team developed flood inundation mapping, which you can use for both potential riverine and coastal flooding situations.
- <https://water.weather.gov/ahps2/inundation/index.php?gage=wasd2>

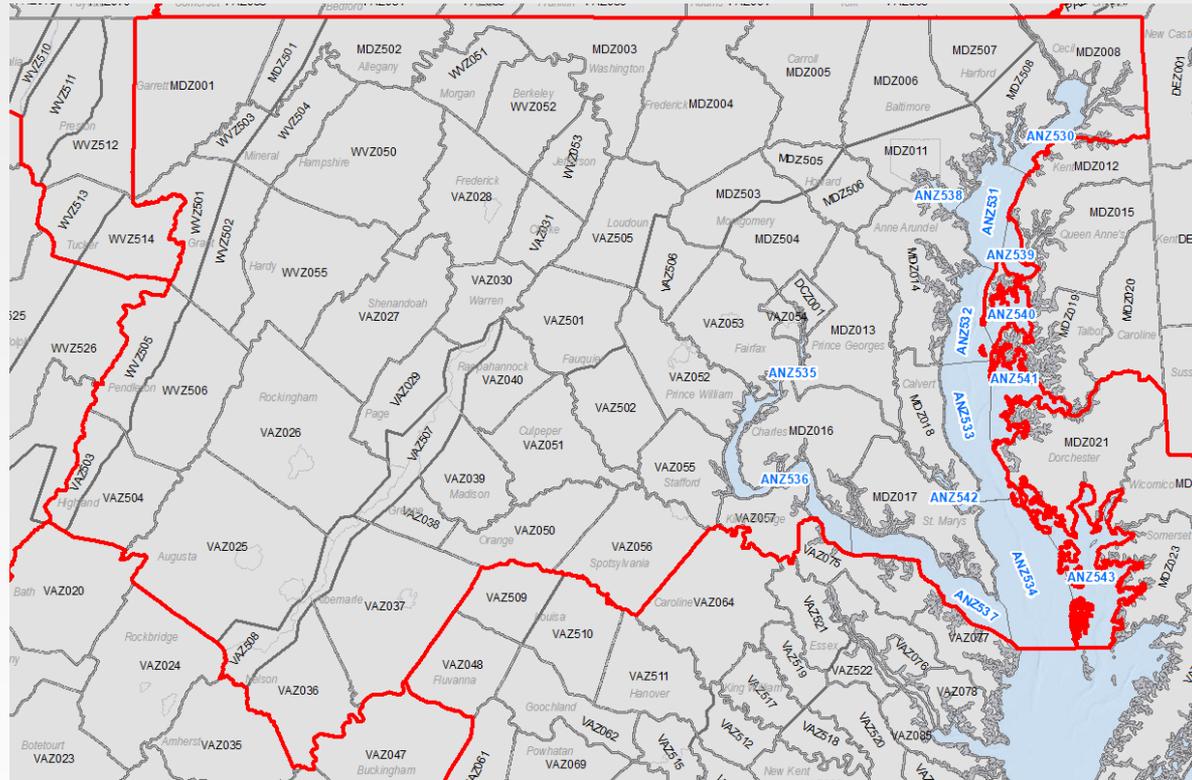


Travel Times (in hours)

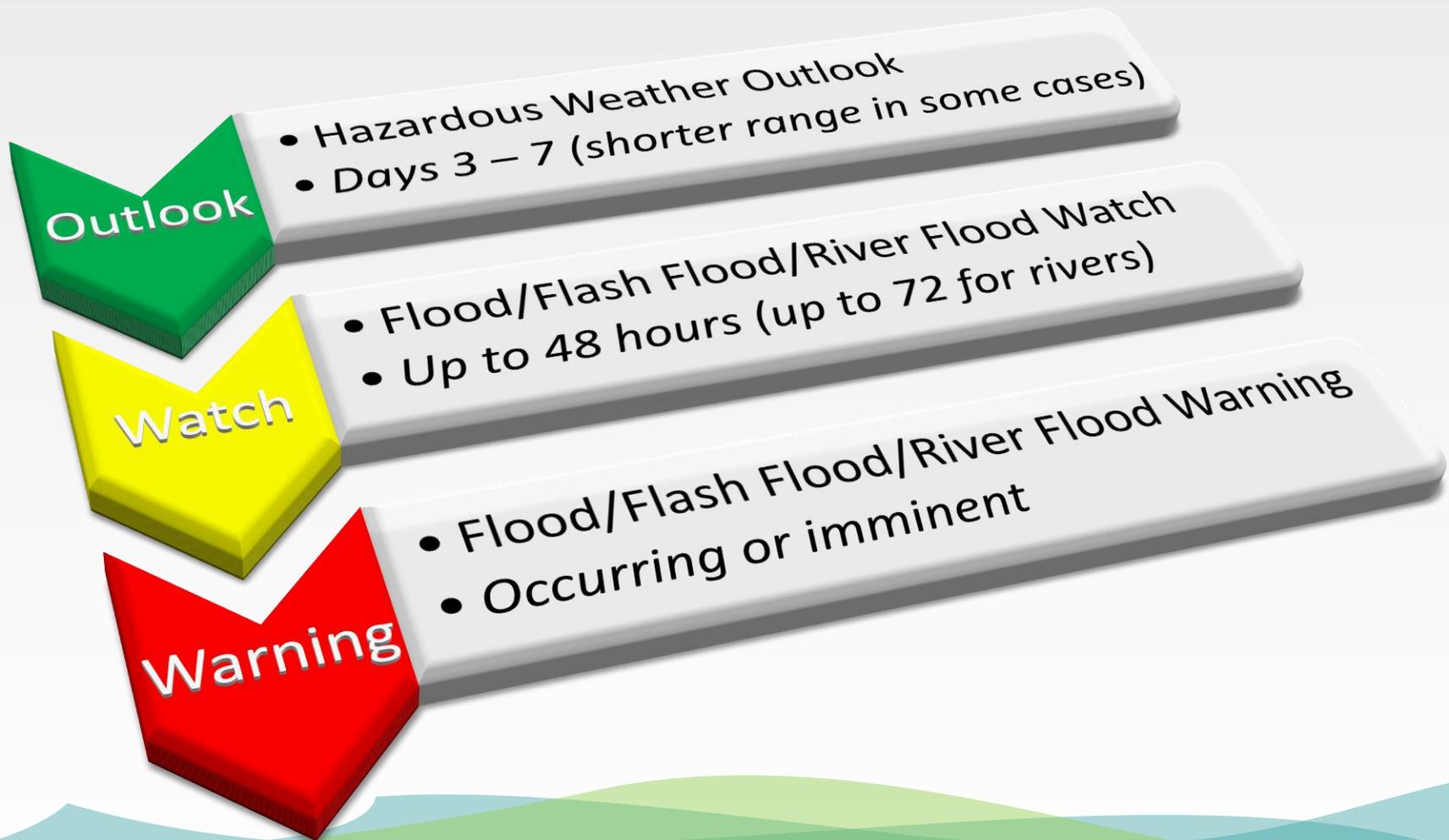


National Weather Service

- The Sterling NWS office covers DC, most of Maryland, northern Virginia, and eastern West Virginia
- Provide water, weather, and climate forecasts and information

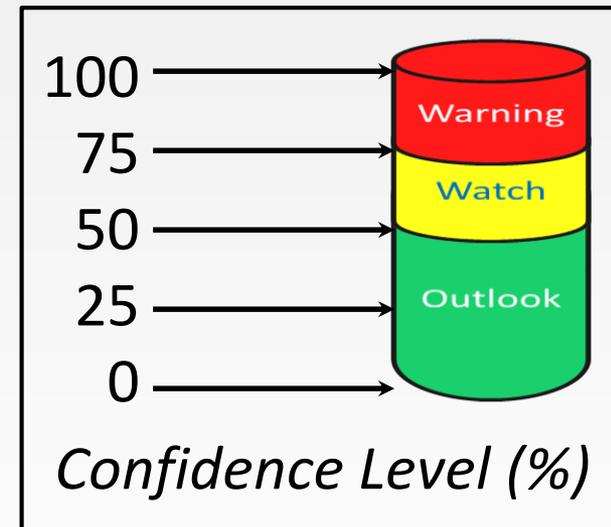


National Weather Service Products



Watch vs. Warning

- **WATCH:** Conditions are favorable for flooding to occur (>50% chance). Be alert for possible flooding during the watch period.
- **WARNING:** Flooding is occurring or is extremely likely to occur (>75% chance). Take action now! Stay out of low areas and seek higher ground if necessary!
- Note: A watch does *>not<* necessarily precede a warning.



Types of Flood Warnings

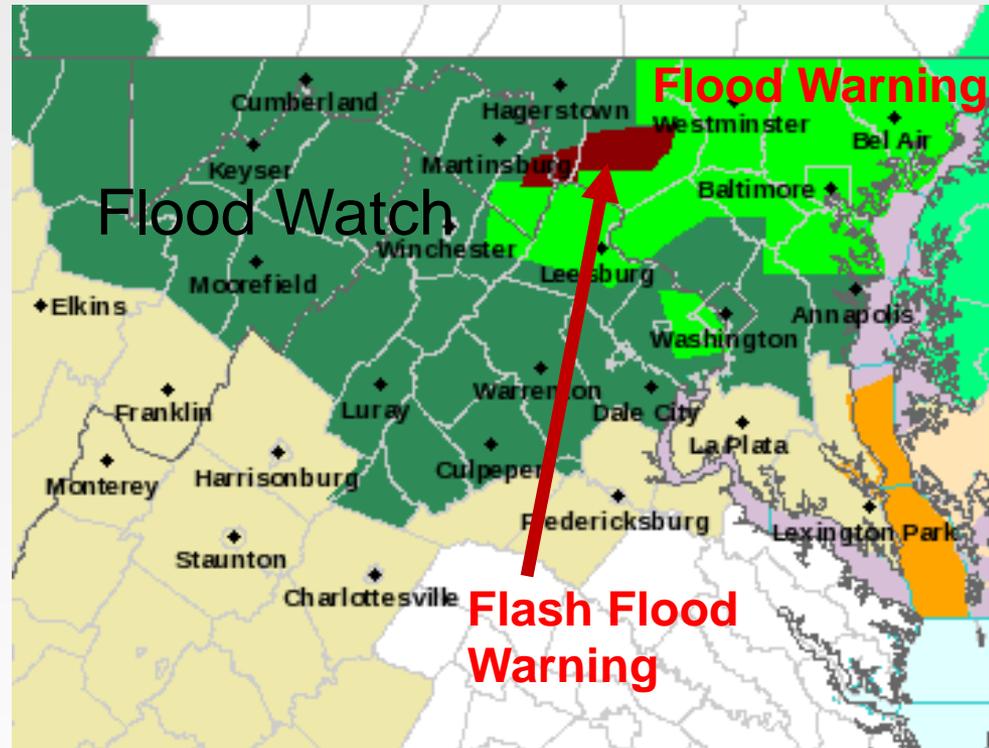
- **FLOOD WARNING:** Flooding is expected during the period of the warning. This flooding will generally be slower to develop (water might not be moving as quickly) but could ultimately become just as significant/severe as a flash flood.
- **FLASH FLOOD WARNING:** Rapid and extreme flooding is expected during the warning period. You will have little, if any, time to react, and swift moving water will occur in some spots. Other locations may experience less impactful flooding.
- **FLASH FLOOD EMERGENCY:** Rapid and extreme flooding is occurring and is causing significant damage or threat to life RIGHT NOW. There is no time to wait; action must be taken immediately and a certain spot (or spots) within the warning area are in grave danger. Other locations may experience less impactful flooding.

Types of Tidal Flood Warnings

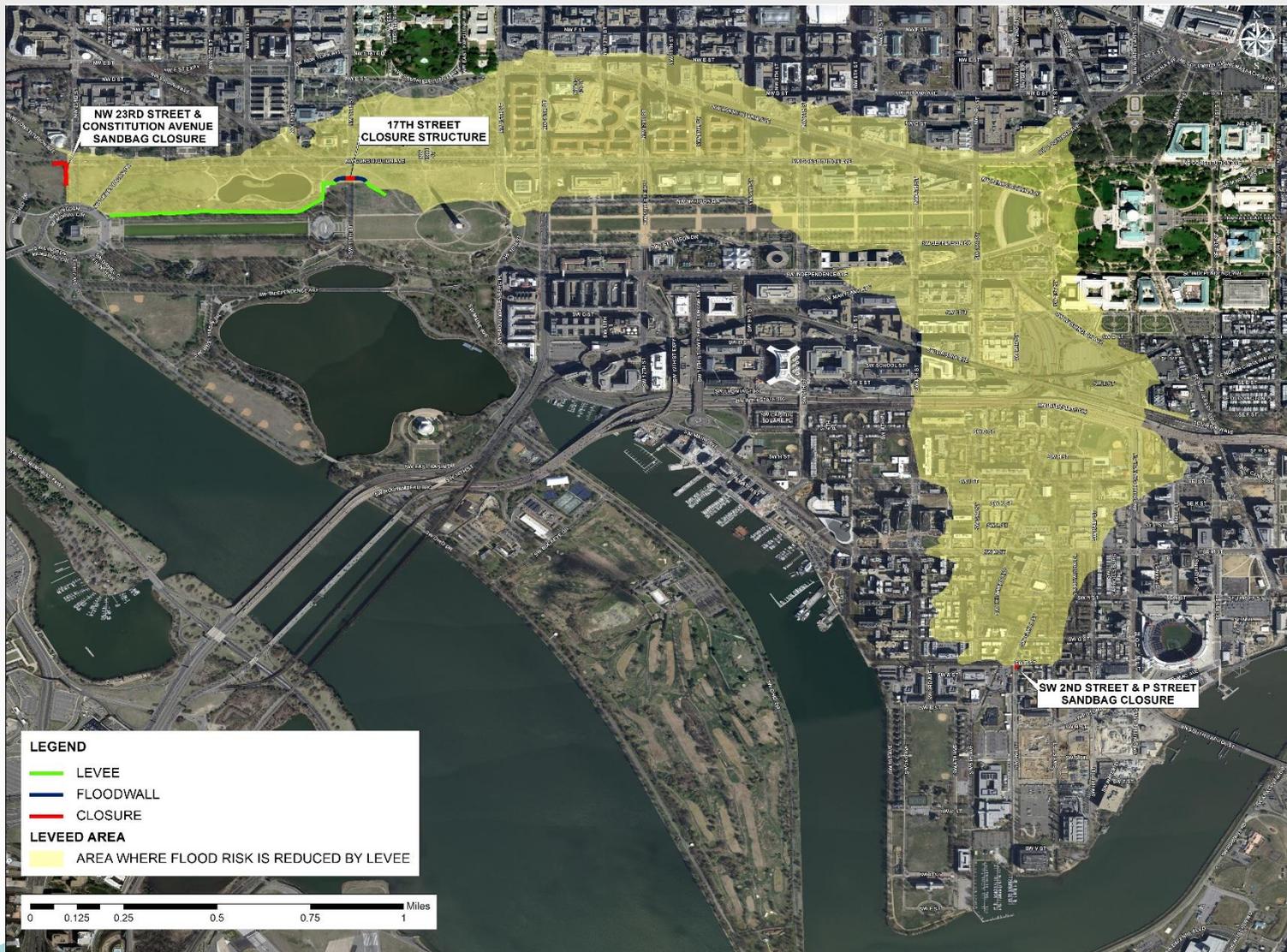
- **COASTAL FLOOD ADVISORY:** Nuisance flooding is expected during the advisory period. This could cause flooding of parklands or walkways near the tidal water areas.
- **COASTAL FLOOD WARNING:** More significant tidal flooding is expected during the warning period. At least one structure will be impacted within the warning area. Roadways or parking lots could also be affected. More areas than usual will experience nuisance-level minor flooding.
- **IMPORTANT:** Coastal Flood Advisories/Warnings are issued in DC regardless of whether the cause is riverine or coastal since DC has a tidal coastline.

Respect the Polygon!

- **All flood warnings (except coastal flood) are issued as polygons.**
 - Limits the area covered by a watch or warning
 - If you're not in a box, we believe your threat is low!
- **Watches are for the entire District (not a polygon)**
- **Reminder:** While all areas in a polygon are perceived to have an imminent flood threat, in many cases only a few small areas will actually experience flooding.



Mitigation Projects – DC Levee System



Mitigation Projects – DC Levee System



Levee



Mitigation Projects – DC Levee System

- A post-and-panel closure will be installed by NPS across 17th Street ahead of any major storms to close the opening in the levee system



Other Mitigation Projects

Joint Base Anacostia-Bolling Levee System

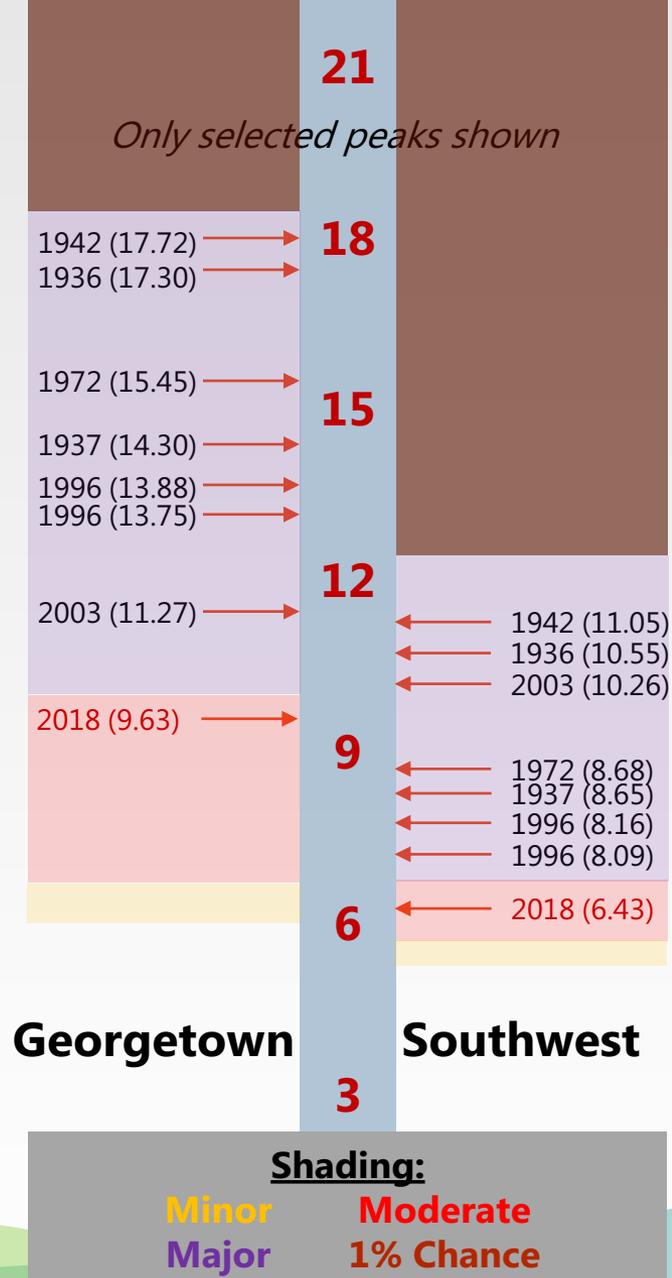


Georgetown Waterfront Floodwall



We are Overdue!

- Last Major Interior Flood (Flash)**
 - July 2019
 - Downtown / Canal Rd
- Last Major Coastal Flood**
 - Isabel (2003)
 - Nothing close since
- Last Major River Flood**
 - Fran (1996)
 - We had three significant floods in 1996 (two river, one coastal)





Questions?

Learn more about the DC Silver Jackets Team:

<https://silverjackets.nfrmp.us/State-Teams/Washington-DC>